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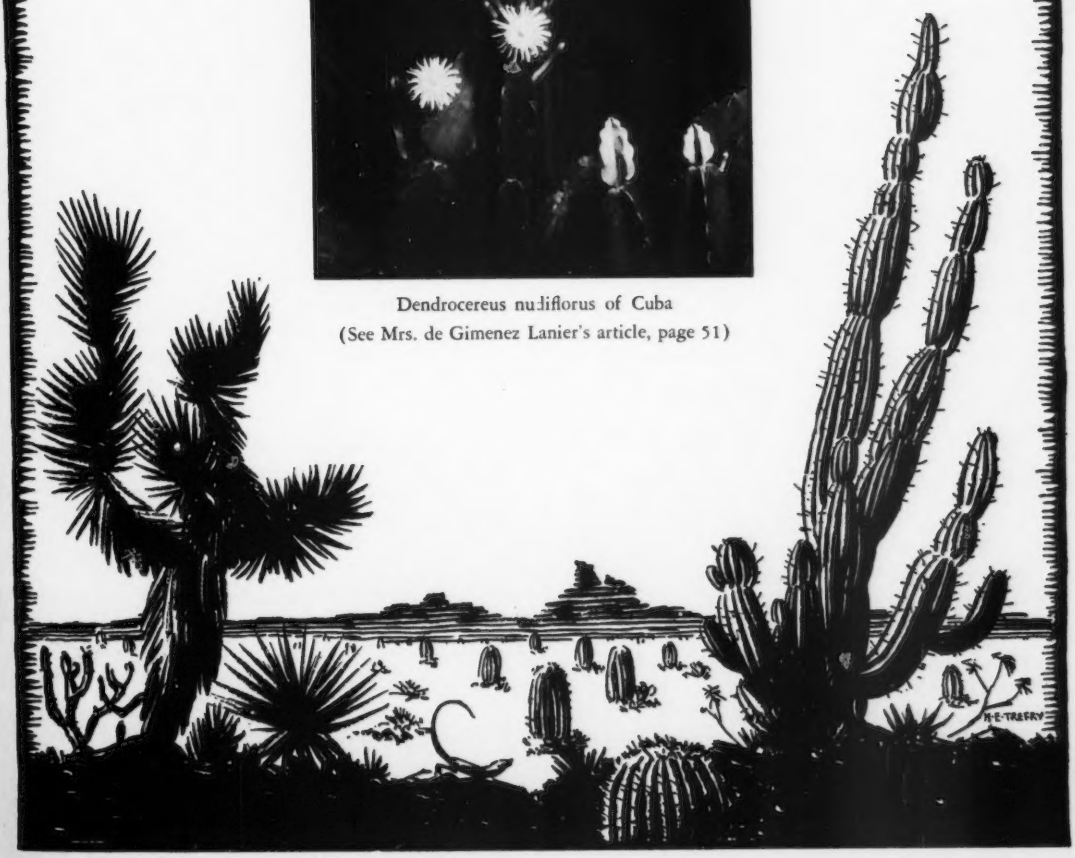
CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society Of America

VOL. VII OCTOBER, 1935 No. 4

Dendrocereus nudiflorus of Cuba

(See Mrs. de Gimenez Lanier's article, page 51)



CACTUS AND SUCCULENT JOURNAL

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EDITORIAL

By SCOTT E. HASELTON

For six years we have endeavored to maintain a purely scientific JOURNAL devoted entirely to cacti and the other succulents; through this effort the CACTUS JOURNAL has become the authority on the subject and is recognized by botanists and scientific institutions all over the world. Such botanists as N. E. Brown, N. L. Britton, L. H. Bailey, David Griffiths and a score of others have all been valued contributors. Today a score of younger botanists are following in their footsteps and contribute their valued studies to our columns.

In order to do a greater work in this field of succulents, the policy of this JOURNAL will be to maintain the scientific standing by publishing new species (such as those by Eric Walther and J. N. Rose in this issue) scientific articles, etc. and to include more material of direct value to the amateur. Those who are scientific minded will be lenient with this new plan since it is only through education that botanists of tomorrow will be developed and unless we gain a greater number of enthusiasts to our ranks our work will not progress.

The plan is to take the student through an introduction to these plants and to lead through evolution into the structure of this particular group to the function of the various organs. Then will follow an outline as to where these succulents are placed in the plant kingdom and how they are grouped in genera and species. Nomenclature will be explained and botanical terms will be listed in detail so that a student will be able to understand a description and to properly describe a plant; the abbreviations, references, authors, synonyms, keys, and the procedure in naming and changing names of plants will all be studied. Supplementing this series will be cultural articles, pictures of the more common species and notes explaining the differences between the various genera.

To be sure, all this material is available in schools, colleges and evening courses, but there are very few of us who have the time for such detailed studies while we are enjoying this hobby of succulent plants. Most books and botany courses are very difficult to apply to our particular work and it is the plan of this series of articles, not to make botanists, but to give the important facts in understandable language so that we may find even a greater enjoyment in our work with xerophytes.

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Full grown plant of *Dendrocereus nudiflorus*

Dendrocereus nudiflorus Engl.

By MRS. EMMA C. DE GIMENEZ LANIER

Among the Cuban cactaceae one of the most interesting is *Dendrocereus nudiflorus,* a coastal species, growing in different parts of the Island.

In 1854 it was first collected by Charles Wright. In 1869 George Engelmann described it as *Cereus nudiflorus* in the "Anales de la Academia de Ciencias" of Havana. He refers to it as arborescent. Undoubtedly he did not see it full grown, because it becomes a tree 40 feet high, with trunk a little more than one foot in diameter, as observed and studied later by Bro. Leon, the foremost observer and authority of Cuban flora. The trunk is subcylindrical, with dense clusters of large rigid spines at the areoles. The branches are large and declining; the joints have three or four ribs. The large white flowers, with rows of lavendar petals, are subfasiculate, often recurved, red birch scented, according to Engelmann. The fruit is the biggest known in the cactus family. They could be used as a splendid source of natural glue, or of pectin to manufacture jelly; it is subglobose or nearly elliptical, green, reminding one of the alligator pear, whence the vernacular name "aguacate cimarron" (wild alligator pear) used to designate this species in the eastern part of the Island.

What is striking, and what greatly attracted the attention of the few botanists devoted to the study of cacti in Cuba, is that for many years after Engelmann in 1869, no further notice of this species has been recorded. Engelmann himself makes no reference to it in the index to his "Botanical Works." The name is entirely overlooked in the "Kew Index" and no mention was made by Schumann in his "Monograph of the Cactaceae." He merely refers the species to *Cereus lepidotus.* Such an important and imposing plant had a right to vindication and a claim to independent standing. This was granted it by the exploration of Mr. William Mason in the year 1907.

Mr. Mason was detailed by the U. S. National Museum to carry on special studies of botany in Cuba with verbal instruction to pay special attention to the cactaceae. He performed his work with great enthusiasm, and one of the glorious results was the collection of a series of specimens of the wonderful *Cereus nudiflorus.* A number of cuttings were sent at that time to Washington, but all died during shipment.

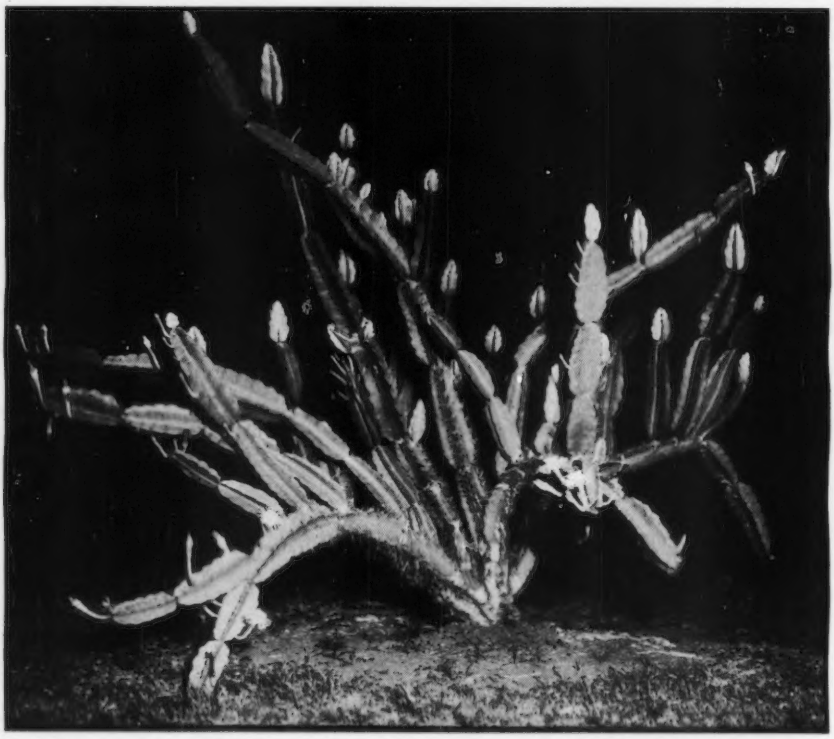
Britton and Rose finally described and completely vindicated this species in their splendid work. Now *Dendrocereus nudiflorus* is considered one of the most remarkable and important

members of the cactus family. In Cuba it is very abundant in isolated places.

One of the pictures illustrating this brief account was taken in the garden of Mr. Julian Aguilera, County Club Park of Havana. It has been in cultivation for nine years. The other picture is one of the specimens that flourish in the elevated coral reef on the northwest part of Matanzas Bay. There are about five terraces on the margin of the Bay. The third terrace is very broad and on it, well elevated and about a kilometer from the sea, the cacti are found. The limestone is very porous and weathers to a red limy soil. Their habitat is therefore on the broad, dry, well drained limestone terrace, well above and back from the sea.

A very large specimen at Tarara Beach, Province of Havana, has a similar habitat, though at a slightly lower level. Brother Leon and Mrs. B. H. Palmer, the well-known American geologist, consider this specimen at Tarara over 400 years old. Probably it witnessed the landing of the Spanish conquerors and still is opening its nocturnal flowers every successive month of May. Seeds of these plants were sent to Dr. R. W. Poindexter for the purpose of cultivating them among cactus lovers. The fruits containing these seeds were intended to be exhibited in the seventh Show of the Cactus and Succulent Society of America. They were so big and odd that customs officers suspected smuggling and cracked the fruits open with an axe, thus preventing visitors to the Cactus Show from viewing one of the rarest sights of the cactus world.

EDITOR'S NOTE: Mrs. de Gimenez Lanier is one of the most loyal and enthusiastic members of our Society and we are looking to her for further information on cacti native to Cuba.



Dendrocereus nudiflorus—9 years in cultivation in the garden of Julian Aguilera, Cuba.

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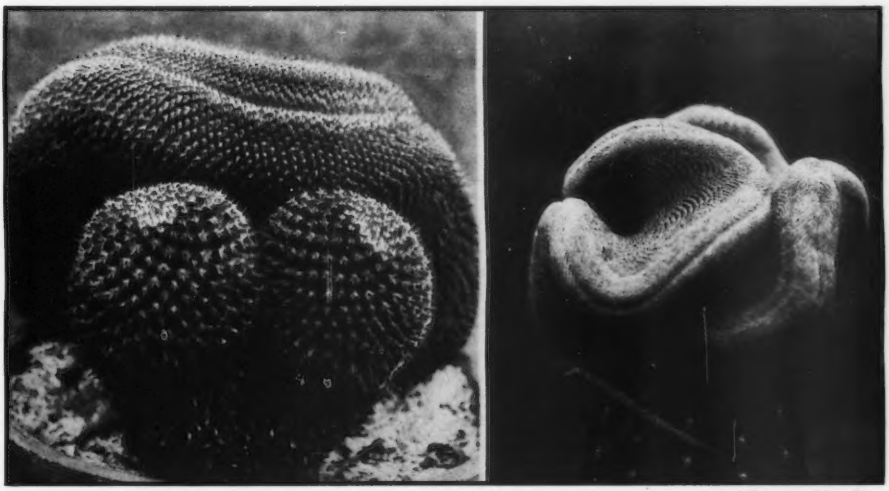


Photo by Haselton

LEFT: *Neomammillaria perbella,* normal and crested forms. RIGHT: Grafted crest of *Pectinata* from South America. Plants in the garden of Dr. A. D. Houghton, San Fernando, Calif.

FASCIATION

By E. C. HUMMEL

Fasciations have always caused in the inquisitive observer a desire to know to just what stimulus these forms were a response. Early investigators, as well as those of later years, have left a literary trail attesting their interest, although all differ in their views as to the cause of these phenomena. In reviewing articles pertaining to these formations, I find little more than a mention here and there concerning cacti, excepting the articles presented in the CACTUS AND SUCCULENT JOURNAL. These contain many noteworthy observations as well as interesting hypotheses. Although the theory that heredity alone is responsible for fasciation and cresting has the best standing, so much evidence has been assembled and so many manifestations claimed, all seeming to point toward transmission by other means, that my observations are given.

Dr. Lowry, a meticulous observer, informs me that a crest was formed in his garden, apparently caused by a blow from a stick in the hands of a small child. The crown was injured and where new growth was renewed, instead of normal symmetry, a cristate form resulted. Just what happened we cannot tell. The plant might have been of such parentage that a crest may have resulted without this accident. Upon the other hand, the blow may have caused such injury to the cells that the growth stimulating substances called "wound-hormones" resulted, causing such an excess of development that there was not enough food material available to carry on other necessary functions, such as the manufacture of secretions which might control the symmetry of the plant. This form of crest would be subject to reversion to normal symmetry of growth if overly stimulated by heavy fertilizing or by grafting.

The rapidity of cell multiplication is much the same as when the embryo cacti, in the seed, multiplies itself around its nucleus as much as a hundred or more times in less than ten days; this would be comparable to malignant growths in human beings, which, while never of proven heredity, is more common in certain families and is known to be caused by injury; in comparison, most crests are developed at a time when the plant has reached maturity. These forms are generally without bloom, showing that mother nature is through with them as reproducers, or for some reason has found them undesirable. Exceptions are infrequently noted, and the majority of these blooming crests are sterile. However, if they do set seed which produce plants,

a certain percentage have the hereditary characteristic of cristate forms. If close line breeding be resorted to, a purified strain can be obtained in ornamental plants, such as the cocks comb (*Celosia cristata*), cultivated for its crested inflorescence.

An interesting crest under observation is *Lemaireocereus thurberi*, apparently the result of injury by lightning the charred fragments being still in evidence. While injuries may cause crests, they are generally confined to the apical center of the plant; codling moth or other insects frequently attack this tender growth and completely destroy it.

There has been much argument that something in the cultivation of cacti causes crests since they are much more numerous in collections than in the wild. This is no doubt due to the additional care given, not only to all seedlings which are raised, but especially to one that gives any promise of becoming crested through either known cristate ancestry or by this unusual form becoming apparent in the seedling.

Among the more prominent scientists who have been interested in this, Prof. Hugo de Vries' work is outstanding. He has proven that an excess of nourishment to plants will bring out inherited crests. However, it is also known this same condition will in some cases have the opposite effect. On account of the uncertainty as to the cause of crests, it is usually impossible to tell if the form of crests acquired is an inherited quality or is caused by injury. But it is known that if it is acquired, the best idea is not to graft or overstimulate them in other ways.

Some of the xerophyte collectors that have scientific foundations and laboratories to thoroughly explore into plant mysteries—and I know there are many—would certainly find a new and untouched field for meticulous investigation in plant anatomy. If plants were able to manufacture food in quantity, but were unable to make use of it, or to make sugar and unable to convert it into starch at a critical time, for instance, at a time when osmosis was causing an excess of turgidity a conversion of sugar to starch would undoubtedly be highly important. If this does not occur, a rapid division of cells usually does, which might create a fasciation if continued cellular pressure did not diminish, or vice-versa, any number of strange and peculiar forms might exist. A good many possibilities suggest that this might be so. This would not alter heredity as the contributing factor in any respect, as heredity is not always particular in endowing its progeny with the ultimate of perfection.

If crests are the result of perfection of growth-urge as some contend, would there not be more of these forms as the direct result of grafting? I have noticed in thousands of grafts not one crest resulting from stimulation, even though the stock had a manufacturing area of 10 to 50 times the area of the scion. Is it not logical to assume that such a test would eliminate that hypothesis and point elsewhere for a foundation? Most of these plants, however, must also inherit the ability to produce new cellular structure about three times as fast as the normal forms. Individual cells are apparently the same size in either form, except that in the center, the cells are much elongated. According to recent research, the size of the cells are governed by a mathematical law which limits their size in different species to a certain maximum, as area increases by the square and the interior by cubic displacement, therefore the exterior covering of the cell could not supply a sufficient amount of oxygen to the interior protoplasm. This could, to some extent, be applicable as a contradiction of the arguments of the anti-grafting faction, as to this practice changing characteristics, as to do so it would be necessary to produce larger or smaller cells.

However, I have developed crests and monstrose forms by reversing the scion in grafting, but I believe this is explainable by the theory of injury, as they usually come very close to the union of the two plants. The monstrose forms are more common, seeming to be a merging of a number of growing centers. When true crests develop in this way we again face the fact that we are not sufficiently familiar with the parentage of our seedlings to prove anything. One thing noticeable is that very young seedlings are more apt to throw monstrose forms when grafted than older plants, probably on account of the tenderness and ease with which they may be injured.

There seems to be much evidence pointing to the location having something to do with the formation of crests. One collector, Barclay Bristol of Nogales, has noticed the chances of finding such forms near the ocean are much greater than further inland. His interpretation is that the reflection of some ray, deviated by the water, may have some effect upon the growth. Upon the other hand it may be the more beneficial climate that would allow a greater number of these forms to exist.

In some cases it seems the theory that credits borers or fungi for cristate formations have very good foundations. The excretions of the larvae is highly nitrogenous in composition and in most instances are not acted upon by bacteria, which would not make them available as a plant food,

but they may act as activators; if larva excretion was composed of compounds that cause crests or other abnormal forms when absorbed by the plant, an analysis would give research biologists a new medium through which to understand these interesting forms. We are all familiar with the galls common on many trees and shrubs, and even on the roots of our cacti, which are caused by the invasion of parasites, the action of which is not as yet understood. These galls take on many forms the nature of which is, in many cases, the only way in which the invader can be identified. It is very possible that in some cases of crests and monstrose forms in cacti this might be the cause. One form which has many things in common with crests is the hexbesen or witches broom which is caused by a fungus which penetrates the growth.

Many experiments have been carried on using x-ray and electricity in an effort to produce crests and monstrose forms in plants, but as far as I can determine there has been no success as yet. In common with this ex-ray and y-rays released by the distintegration of uranium into more staple compounds has been suggested, but not thoroughly tested, as a possible cause of mutations by many of the most outstanding authorities. In the White Mountains, a range that parallels the Eastern slope of the Sierra Nevada Mountains, is one of the world's greatest producers of lead and silver, the Serro Gordo mine east of Keeler, California. From this mine north to Bishop this lead bearing strata intermittently appears and is traceable if you command a high point of view. The formation asserts that at one time a tremendous amount of radio activity was centered here and many mineral bearing waters of the vicinity contain radium in minute quantities. This lead bearing ground may not be conclusively the result of a disintegration of uranium into lead, but such a possibility exists. I have noticed extreme difficulty in some localities of that vicinity of securing good pictures owing to the sensitiveness of the films which deteriorate quite rapidly if not promptly used. Of course electrolytic action is endlessly in progress wherever stratified ground exists, which so far as I know has been given little consideration by botanists. If the rarer elements alluded to, and a possible means of forming crests were directly responsible, would there not here be representatives in predominate quantities? However, I do not remember having ever seen any fasciations in this vicinity, although I resided there for more than ten years.

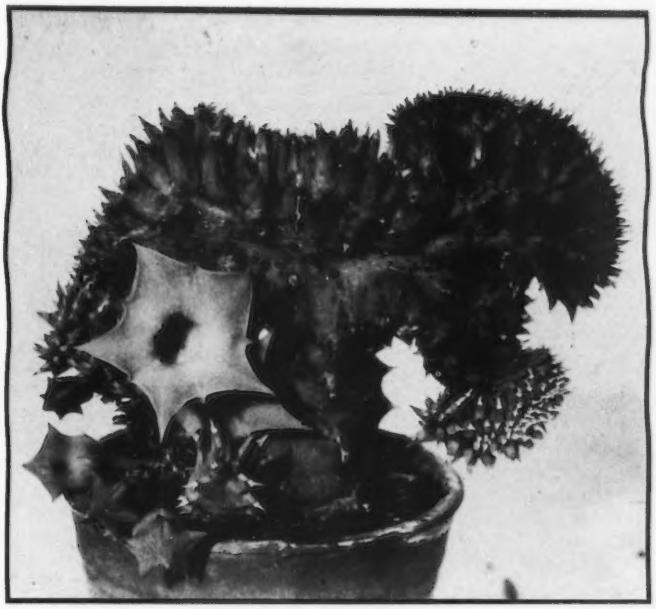


Photo by Sloane

Huernia primulina var. *rugosa cristata* courtesy White & Sloane Stapelia collection.

In a large crowded cluster of *Rebutia minuscula* several of the individuals are crested, compression of the growing centers is evidently the cause. This phenomenon I have noticed in several other clusters that were overcrowded to such a degree as to retard free growth; this and the fact that placing plants in such a position as to have all the light enter from one side and turning at long intervals, causes a monstrose growth, for which it is impossible to detect the cause. These are reasons why a collector of these growths must use every precaution in buying. Also in this connection it must be remembered that spines are used as a light filter, therefore under artificial growing conditions a very poor characteristic by which to identify either fasciations or other forms.

To propagate crests, I prefer grafting instead of rooting, as some are extremely difficult to establish on their own roots, some cases requiring two years or more. In grafting, you eliminate this feature and in most instances a few weeks are all that is necessary for the resumption of new growth. A prevalent error in grafting these forms is the tendency to cut the scion to the previous year's growth. In doing so the chances of success are greatly reduced, as the cellular structure is too old to make a satisfactory union. Cells are comparable to plants in that they pass through a cycle of juvenile, mature, and old age forms. From my experience, the uniting of cellular structures that are just entering maturialy in both stock and scion is most satisfactory.

Incompatibility of stock and scion will sometimes cause cristates to split from one end of the growing center to the other. This can be controlled by forethought and due consideration in selection of stock or by allowing a period of dormancy for the scion by not stimuating growing activity in the stock at a time when it has no tendency to reciprocate.

It is a very common experience to cut into a crest and find a hollow center in the portion of what was once the growing center of the plant and invariably where this is encountered, the older tissue has well developed rootlets but a peculiarity quite noticeable is the absence of root hairs. In many instances this cavity is filled with a putrid, dark liquid that seems to be caused by condensation of moisture which is the result of fluctuation in temperatures. I assume this, because it is more consistent in green houses than in the open garden. In some cases the crests apparently absorb this liquid segregating the solid material and depositing it on the wall of the cavity as a brownish substance of a greasy paper consistency and very fragile. Where this process has repeatedly occurred without external rupture the loss of the plant is just a question of time, unless propagation can be had from the uppermost tissue. It is very hard to graft or reroot as the plant tissue has all the evidence of septic poisoning disseminated throughout its entire area.

In grafting crests, where one has the tendency to be sparing of the scion, it is well to consider, osmosis, exomosis and endosmosis, as here lies the key to successful grafting of crests as well as normal forms. If a scion of recent growth be placed upon an old stock, it is quite possible that it will be dehydrated, where if the scion be of slightly older growth than the stock, its concentrated food will cause the stock to liberate sap into the scion in an effort to lower the specific gravity to a neutral one and this is why we often hear in tones of amazement of a graft which showed new growth immediately after grafting, while another made a month earlier had a dried up appearance. The second graft had the advantage of endosmosis while the other had the adverse condition or exosomsis. For a practical as well as interesting explanation of osmosis that can be conducted with an egg, see page 46, Elements of Botany by Berger, 1904 edition.

This is not to be considered a thesis on fasciations and mutations, but I have tried to bring the most outstanding hypothesis and facts pointing in the direction of the possible source and reasons for this phenomena. Also a possibility exists that many writers of note have been overlooked, from inability to obtain their work, others from the unfamiliarity of their language. In no case has any attempt been made to discriminate in any way regarding their views. I merely present comparative observations that have been made in my garden and the field, in the hope that some little peculiarity may have been noticed which may be useful to others more capable to experiment further.

EDITOR'S NOTE: Mr. Hummel captured sweepstakes at the last National Cactus Show and is known for his many practical experiments in propagation and the use of various kinds of light to bring a plant to full, but early, maturity.

CACTUS JOURNAL

I find the Journal a wonderful help to me, a beginner in the collecting of cacti and succulents.

E. F., Dallas, Texas.

In case that you are interested in the readers' interests, I speak for more of Mr. Walther's writings on Echeveria. In fact I'd like to see you publish his monograph.

R. M., Stanford, Calif.

The following 8 pages are the tenth installment of the reprint of Britton and Rose "The Cactaceae" Vol. II.

The Study of Succulents

I. Why are People Interested in Cacti?

The first time that I visited California the landscape did not please me. Arid lands, dry looking hills, apparently no lakes or rivers—I soon left for the East, where grass is green and broad rivers and lakes abound. My first view of the desert aroused no interest. Spiny brutes of plants everywhere meant no more to my unseeing eye than California as a whole. After returning East the glories of the California sunsets, the ever changing mountains, the occasional cactus flower which I had barely looked at began to awaken my spirit.

It is thus with persons who first see cactus plants. Many of the specimens shown the visitors have been torn from their native habitats and subjected to such adverse conditions, that they show none of their beauty. So it is not surprising that California, tomatoes and cacti represent a taste that must be acquired by culture.

Now the beauty of California having entered my soul, I have learned to see with new eyes. Much of California belongs to the semi-arid regions of low rainfall and with this in mind, one must realize that the tender rain loving plants of other countries do not grow here in the wild, but that this vegetation is largely replaced by plants which have learned through the ages to adapt themselves in various manners to living in arid or semi-arid conditions.

One is impressed even from the window of a train with the giant sajuaro or as it is scientifically called *Carnegia gigantea,* standing like a vast telephone pole with three or four arms raised heavenward to a height of 20 to 40 feet; or by the giant succulent plants called the Joshua trees. How few, however, take the trouble to look for the smaller cacti with their numerous spines, unless one chances upon them at the time when, out of these ugly plants, come flowers among the most beautiful in all creation.

Nor are cacti and succulent plants confined to the United States. Succulent plants are to be found all over the world in regions of low rainfall, but cacti are truly American plants to be found growing wild only upon our continent and extending from Central Canada to Patagonia; from the Mexican Border to the Cordilleras of South America, cacti are found in great profusion, ranging from columnar types many of them having long hair of various shades from white and golden to red and black, to those that are only tiny balls covered with intricate patterns of spines, frequently of great intrinsic beauty.

To a person just beginning to show an interest in these plants, one look at one of the newer Epiphyllums is sufficient to cause the disease called Cactusitis. The flowers of these plants measure up to 14 inches across, and no orchid, nor rose, nor Japanese Iris can equal them for richness of coloring. At once it occurs to your mind "Why doesn't he mention first the night blooming cereus?" Beautiful as it is, it can only be seen at night and is always white, while the Epiphyllums rival the most gorgeous sunsets in their coloring; they are as easy to grow as geraniums and require as much water and food, except they must have a rest during their normal resting period.

Not every plant that has spines is a cactus. The cactus belongs to a definite family of plants which botanists call the Cactaceae, all of which have a berry fruit with no divisions between the seeds. If you cut the fruit of an orange across you will note that the seeds are in separate segments, while in the cacti they are always in one big cell. A cactus also has its stem covered with little protuberances called areoles from which the spines emerge and which can give rise to roots, branches or flowers; cacti are also all perennial, i.e., they keep on growing from year to year; and another point: they are what botanists call caulocarpic, i.e., they do not die after flowering.

Succulent plants are any plants adapted by nature to withstand spells of drought by thickening of the leaves, or the absence of leaves with thickened stems and thickened skins, so as to conserve any moisture which has been taken up by the roots. It must not disperse its water too fast under conditions of continued drought in hot sunshine. Thus you can see that all the cacti are succulents, but not all succulents are by any means cacti. The cacti constitute one family, while succulents are to be found in twenty or thirty of the 200 different families of flowering plants.

Besides the beauty in form and color, cacti have many uses. The prickly pear is a cactus belonging to the genus Opuntia and improved forms make a large, sweet and juicy fruit much more appreciated in Mediterranean countries than in ours. Only one or two plantations are raising this fruit for the American market, and

this fruit goes only to exclusive hotels and clubs in the East. While very desirable, the Opuntia fruit is far from being perfected to the point where it will be one of our leading table delicacies. There is a smaller species of Opuntia from South America which not only has a strong and pleasing fragrance, but a delicious delicate flavor unlike that of any other fruit; this may be crossed or hybridized with the large fruiting Mexican Tunas giving rise to a new race which will find its way into the cuisine of the world.

The opportunities which are open to the reader to find the valuable uses for even the more common forms of cacti and other succulents are unlimited and there is both pleasure and profit to be had from the study of these still little known plants.

Cactus collecting has had its periods of popularity and decline for nearly a hundred years with the oldest and largest collections beginning in Europe. It is always surprising that Europe should have been the first to collect cacti since these plants are not native to the Continent, but are found only in the Americas. The early traders touching all parts of the world brought back to Europe these wierd and grotesque plants with the result that collections were started long before the "fad" reached this country in the 80's.

In 1895 the fad was in full force and like all fads it quickly died, leaving a few fine collections such as those of William Maechtlen, William Hertrich (Huntington Botanic Garden) and A. D. Houghton. Ernest Braunton and L. P. Edlefsen were active in the cacti world of that time and can tell of large commercial gardens which have never since been equalled. Botanical gardens became interested in these exotic plants and small collectors became students as they endeavored to work without literature, the only available material being catalogues such as Blancs and a few pamphlets in German. In 1919 Carnegie Institution spent $57,000 to record all available material on cacti and how well this was done, even with the meager material available, is represented by Britton and Rose THE CACTACEAE.

In 1928 interest in cacti regained popularity in this country and everyone started collections. Many people bought expensive plants only to see them die simultaneously with their interest in succulents; many collections were lost due to pests, frosts, sunburn and a hundred other difficulties. Others collected so many plants that they became slaves to their hobby and soon gave them up. Only within the last few years has collecting gained a sound basis due to the literature that is now available and which contributes much towards keeping alive this interesting work.

A collector now starts with a few common plants and experiments with soil, water, exposure, potting, control of pests, and propagation. Then he is ready for the rarer kinds which are now available under correct names. Most collectors now have a group of plants of general interest for variety and then specialize in one group or one genus. This keeps a collection from becoming burdensome and the plants will have a scientific value as he contributes to the ever increasing fund of cactus information.

Our field men should be given great credit in their present day work. Such men as Backeburg, Werdermann, Walther, West, Gates, Marshall, Lowry, Pirtle are all contributing their valuable finds to science—all of which will help to keep alive, not only collecting as a hobby, but will place this group of plants on a just and permanent place in the realm of horticulture.

EDITOR'S NOTE: This is the first pamphlet recommended for use of the student who is following the educational series in this JOURNAL. This pamphlet which deals with cacti only, will give the detailed uses of cacti and gives one a general idea of this group of plants.

U. S. DEPT OF AGRICULTURE
Circular No. 66

This pamphlet CACTI by David Griffiths and Charles Henry Thompson was first published in June, 1929, and has been out of print until this year when it now is available for 25 cents. Send direct to the Dept. of Public Documents, Washington, D. C.

This pamphlet include a brief discussion of the following: Propagation, Culture, Diseases, Insect Pests, Economic Value, Decorative Value, Pecularities of Cacti, Cultivated forms.

DUDLEYA PULVERULENTA DISTRIBUTION

Dear Mr. Baxter:

We have just received the August Journal with your article on *Dudleya pulverulenta.* We have found many beautiful specimens near Pismo and north of Avila or southwest of San Luis Obispo (all California coastal cities). Your description of the plant corresponds to our knowledge of it in the above named localities. Lopez Canyon, near Pismo Beach, is said to contain many *Dudleya pulverulenta.* One hillside very easy of access was a sight to behold with small, large, and double specimens.

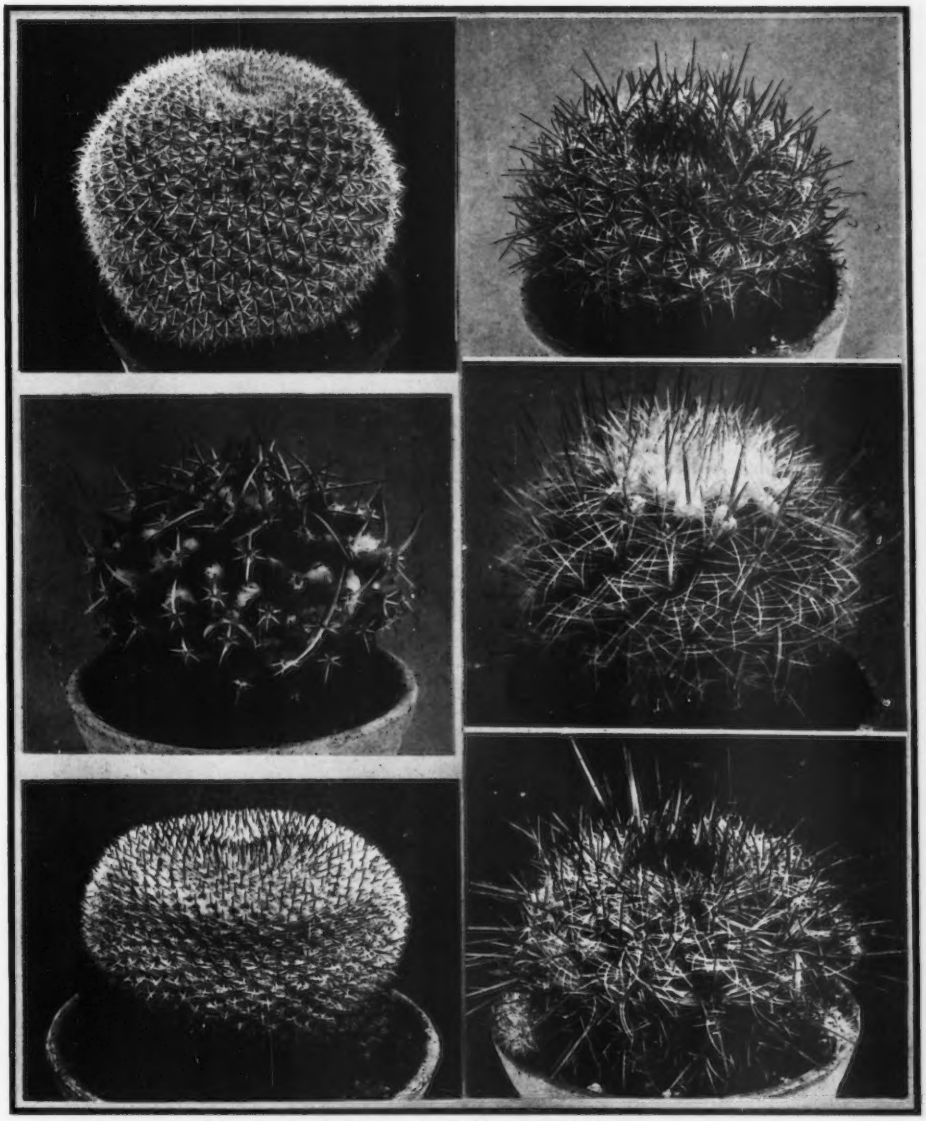
MR. AND MRS. ROBERT O. HALL,

EDITOR'S NOTE: Mr. Walther will be glad to communicate with anyone seriously interested in his work. Living plants of many of the species are available. Another expedition to Mexico is planned for the fall. Anyone interested may address Eric Walther, 2667 McAllister St., San Francisco, Calif.

SUCCULENTS

Received the copy of "Succulents" by van Laren. I have never given a gift which was so pleasing.

L. D., Washington.



NEOMAMMILLARIAS FROM MEXICO

A group of seldom seen and new cactus are shown here from photographs sent by Ferdinand Schmoll, Mexican cactus exporter. The names given are his: *Mammillaria* is *Neomammillaria* of Britton & Rose, and *Stenocactus* is included in *Echinofossulocactus* by the same authorities.

Mammillaria aljibensis
Mammillaria bicornuta Trez.
Mammillaria martinezi Trez.
Stenocactus grisacanthus
Stenocactus rectospinus
Stenocactus bravoiae

Notes on the Genus Echeveria

By ERIC WALTHER

II. SOME NEW SECTIONS, SERIES, SPECIES, VARIETIES AND COMBINATIONS

ECHEVERIA DC. Section **Vestita** EW., new section.

Plants hairy on all exposed parts; trichomes elongated, with one or several cells in one series; inflorescence variable; corolla always with thick segments strongly keeled on back and deeply hollowed at base; nectaries mostly large and prominent.

8. Echeveria harmsii F. McBride.

Oliverella elegans Rose, Bull. New York Bot. Gard., 3:2. 1903.
Cotyledon elegans N. E. Brown, Bot. Mag., pl. 7993. 1905.
Oliveranthus elegans Rose, North. Am. Flora, 22:1:27. 1905.
Echeveria elegans Berger (*not Rose*), Pflanzenf. Ed., 2:18a:472. 1930.
Echeveria harmsii F. McBride, Field Mus. Publ., 288, Bot. Ser. *11*:1. 1931.

Remarks: We agree with Berger and McBride that this can not be separated logically from *Echeveria;* that is, unless the latter genus should be subdivided very extensively, since some of its series differ more widely from each other than does this species from its allies. Berger erred in using the name *elegans* for this, since *E. elegans* Rose, having been the first species of *Echeveria* to receive the name *in that genus,* must now retain it.

8a. Echeveria harmsii var. **multiflora** EW., new variety.

Typo similis, sed cyma bi- vel tri-fidas plurifloribus abludens.

Inflorescence many-flowered, with two or more secund branches, each with 5 to 6 flowers similar to those of the type; leaves unknown.

Type specimen: Herbarium of University of California, No. 136164 (Purpus 09/3935).
Locality: Cerro de Chicamole, 7 to 9,000 ft., Sierra de Mixteca, Puebla, Mexico.
Additional material seen: US. No. 1319918 appears to be a fragment of the same collection, consists of but a single flower and is labelled *Echeveria magnifica.* US. No. 1165083 (Ortega 23/5040) from Balboa, Sinaloa, seems the same, but is quite leafless, too, may have been from a cultivated plant, and is labelled (by Dr. Rose?), *Echeveria ortegae.*
Remarks: The term "Magnificent" indeed fits this *Echeveria,* which would truly deserve the name of "most remarkable of Crassulaceae," but most regrettably is not yet in cultivation locally. So far our efforts directed at its introduction have been in vain, but we are still hopeful. In the absence of all knowledge as to its foliage, we forbear describing this as a new species; actually, it differs from the type in nothing except the number of flowers. Thus disappears another of the generic characters depended upon by Rose for distinguishing the genus.

ECHEVERIA DC. Section **Secundiflora** EW., new section.

Inflorescence secund, simple or compound; pedicels not bracteolate.

Series **Urbiniae** (Rose) EW. new series. (as a genus by Rose).

Leaves turgid, in dense, stemless rosettes; inflorescence racemose, simple or 2 to 3-fid; pedicels slender; sepals very short, connate at base; corolla globose-urceolate, often greenish-yellow at tip; nectaries small, thin.

Type species: *Echeveria agavoides* Lemaire.

9. Echeveria agavoides Lemaire.

Echeveria agavoides Lemaire, Ill. Hort., *10*:Misc. 78. 1863.
Cotyledon agavoides Baker, Saund. Ref. Bot., 1869, No. 25.
Urbinia agavoides Rose, Bull. New York Bot. Gard., 3:12. 1903.
Urbinia agavoides Rose, North Am. Flora, 22:1:32. 1905.
Urbinia obscura Rose, Bull. New York Bot. Gard., 3:9:12. 1903.
Urbinia obscura Rose, North Am. Flora, 22:1:32. 1905.

Remarks: In following Berger's example and reducing *Urbinia* Rose we are guided largely by recognition of the fact that there is less difference between *Echeveria elegans* Rose and *Urbinia agavoides* Rose than between the latter and *Urbinia purpusii*. All of these are of course closely allied and belong together into one group.

Careful examination of Rose's type of *U. obscura* and all accessible specimens authenticated by him lead us to the conclusion that this is merely an abnormal condition of *Echeveria agavoides*. The increased size and number of bracts alone are insufficient to separate this species, since similar aberrations are of frequent occurrence in other species. Part of the original material of *Urbinia obscura*, No. 9944A, at New York, shows the normal small, narrow bracts of *Echeveria agavoides*, in fact, only a single sheet seems extant of typical material as described by Rose.

10. Echeveria potosina EW., new species.

Acaulescens vel caule brevissimo; rosulae solitariae (non cespitosae), parce soboliferae, foliis turgidis, truncatis, albido-purpurascentibus, 4 - 6 cm. longis, 2 - 3 cm. latis; scapus tenuis, 30 cm. altus; flores 6 - 7, valde urceolatae, 13 mm. longa, colore roseae apicibus virescentibus; sepala brevissima, usque ad 3 mm. longa; pateus; petala connata ad 4 - 6 mm.; squamae tenuis.

Plants stemless, rosettes dense, with few or no offsets; leaves very thick and turgid, obovate-cuneate, mucronate, 4 to 6 cm. long, 2 to 3 cm. broad near apex, of marble-like texture, color pale glaucous-green, with decided purplish tinge at tips; inflorescence a secund raceme to 30 cm. tall; bracts few, appressed; flowers 6 to 7; pedicels 6 to 7 mm. long, thickened below calyx; sepals very unequal, three very short, the two longer ones at most 3 mm. long, scarcely extending beyond base of corolla; corolla strongly urceolate, to 13 mm. long, 9 mm. in diameter at base, 7 mm. at apex of the outcurved tips of segments; color begonia-rose, with tips neva-green; segments thinnish, scarcely keeled, little hollowed at base, connate for 4 to 6 mm.; carpels thick; styles short, greenish; nectaries thin, oblique, maize-yellow, to 2 mm. wide.

Type specimen: Cal. Academy of Sciences, No. 223896 (E. Walther 1933/53).

Type locality: Living plant received through Romeo & Posselt from San Luis Potosi, S. L. P. and presumably indigenous in that portion of Mexico; now growing in collections at Golden Gate Park, San Francisco, California.

Remarks: At first glance this closely resembles *E. elegans* Rose, but differs clearly in the scarcity of offsets, such a striking feature of the older species. Additional points of difference are the longer, straighter leaves with a thicker, more truncate apex decidedly purplish in coloration; the more strongly urceolate corolla conspicuously green-tipped in bud; the shorter, more widely spreading sepals; and its different occurrence and range. The new species is an interesting addition to the group *Urbiniae* and is fully as distinct as its other members.

11. Echeveria gilva EW., new species.

Acaulescens, cepitosa; foliis pluribus, turgidis, obovato-oblongis, acutis, 5 - 8 cm. longis, 20 - 25 mm. latis, colore gilvis (non glaucis); racemae secundae, simplices vel bifidae; bracteae minores; pedicella 5 - 7 mm. longa, tenua; sepala inequalia, majora usque ad 4 mm. longa; corolla 9 mm. longa, 7 mm. crassa, urceolata, colore rubescens apicibus flavo-virentibus.

Rosettes dense, stemless, with numerous offsets in age; leaves many, thick and turgid, obovate-oblong, acute, 5 to 8 cm. long, 20 to 25 mm. broad, concave above, kildare-green tinged flesh-pink at edges and apex, not at all glaucous, of cristalline texture due to translucent epidermis; inflorescence secund-racemose, simple or occ. bifid, to 25 cm. tall; bracts few to many, appressed, to 20 mm. long, acute; raceme 10 cm. long, with 12 flowers; pedicels 5 to 7 mm. long, slightly thickened below calyx; sepals unequal, longest to 4 mm. long, deltoid-ovate, acute, color eugenia-red; corolla conoid-urceolate, app. 9 mm. long, 7 mm. in diameter at base, 4 mm. at mouth, scarcely angled, geranium-pink with keel spectrum-red and tips viridine-yellow; segments thin, scarcely hollowed at base; carpels gradually narrowed into the peacock-green styles; nectaries thin, oblique, nearly white.

Type specimen: Cal. Academy of Sciences, No. 223895 (E. Walther 35/52).

Type locality: Known so far only from cultivated plants.

Remarks: While description of this as a valid species may be questioned, the writer personally feels that this is not a hybrid, showing as it does so clearly the distinguishing characteristics of the Series *Urbiniae* without admixture of any foreign features.

In its yellowish foliage this differs from *Echeveria elegans, E. simulans, E. cuspidata* and *E. potosina*, while its shortly-pointed leaves separate it from *E. agavoides;* and the mostly simple inflorescence, strongly connate sepals, etc., serve to distinguish it from the imperfectly known *E. corderoyi*, under which name it may sometimes be found.

"Gilva" has reference to the color of its foliage.

(*To Be Continued*)

A typical rocky desert landscape showing *Ferocactus acanthodes* in Devil's Garden, near Palm Springs, California.

Notes for the Amateur on Cactus Soils

By HARRY JOHNSON

Perhaps one of the most important factors in the successful growing of desert plants is the proper selection of soils. The matter, generally speaking, is a very simple one, although unless one understands the basic principles underlying the selection it is very easy to get into difficulties. Perhaps the best way to become conversant with the problem is to picture how the plants grow wild.

Generally speaking, cacti are mostly found in rough, hilly country and not on flat sandy deserts as you might suppose. Even where they are growing on the great plains, they are most generally found growing on the walls, or mountains of barrancas or canyons. This is true of by far the greater number of species. Naturally such rough country is rocky and such soil as is found will be coarse and is usually mixed with quite a bit of rough dried leaves and humus formed from the sclerophyllous vegetation of these areas. The plants often grow in crevices of rocks where the roots ramble for long distances in the thin coating of sandy soil and humus that has filtered in between the cracks. The particular kind of soil found, of course, is dependent upon the nature of the rocks forming the substratum. While these may be igneous, they are often sedimentary and where sedimentary they are often calcareous or impregnated with various forms of lime. Soils of these desert regions are often red and seem to contain quite a bit of iron. With these thoughts in mind it may be easier to picture the type of soil that your plants will revel in.

Remember too, that in these dry areas the rainfall seldom exceeds twenty inches a year. In places it may drop to almost nothing. The desert

regions of California and Arizona perhaps do not average ten inches a year. Combine this lack of moisture with clear skies almost the year long, and the terrific temperatures of these regions, shielded from the ocean breezes, and you will have a set of growing conditions very different than those under which the ordinary garden flowers thrive.

When mixing a potting soil, one must bear in mind that the plants one is growing will be living under far different circumstances. It is not necessary, nor indeed desirable, to try to emulate the natural conditions. But the conclusions that one draws are that the plants would like a coarse gravelly soil with some leaf mold, some loam, some form of lime, and ferruginous material; in other words a loose, open, friable, non-acid soil. Any combination that gives this desired texture will be suitable for your plants.

I would suggest a soil composed of one-third fine gravel (from some gravel bank that has been used for road metaling), if it is reddish in color so much the better; one-third good friable, loamy soil, preferably not a clayey type; and one-third leaf mold. Mix with this some old crushed plaster from a house being torn down or mortar from an old brick wall. If none of these are available, use a little well hydrated lime—to a bushel of soil perhaps a four-inch pot. It would not be amiss to add a good sprinkling of granulated charcoal to the mixture, and often-times success is given with plenty of pounded brick or crushed potsherds. If none of the ingredients of this type are at hand, a very good substitute may be had by using coarse sand, two-thirds; leaf mold one-third; with a sprinkling of peat moss and lime. In fact, for the beginner this type of soil is splendid for it drains very rapidly, and while the plants will not grow so fast, they will generally stay in good health.

None of these soils should be run through a sieve finer than one-fourth inch. In fact none of our soils are run through a sieve finer than five-eights inch which, as you can readily see, gives a coarse mixture.

Don't let any of the "do's and dont's" discourage you for there are thousands of cactus fans throughout the country who are growing plants under every conceivable condition and having good success. Friends have written me sending pictures of plants that they have had for 25 years or more and that have bloomed and grown splendidly under conditions which I would have sworn no plant could have existed. Watch your plants carefully and don't pay too much attention to specific directions as to how plants may be grown for no two gardeners ever do the same things in the same way.

EDITOR'S NOTE: A visit to Johnson Water Gardens in Hynes, California, will convince even the most skeptical that beautiful specimen cacti can be grown from seed. A few years ago Harry Johnson grew his seedlings in the humid atmosphere of his indoor lily and fish pools and it seemed to be a battle for popularity between lilies and cacti. Now the thousands of flats of seedlings have glass houses of their own, not to mention the hot frames, lath houses and open ground plantings. There is little wonder that cacti seedlings are so popular with their brilliant colors and varied forms. Readers of the JOURNAL are fortunate to have this series of articles from one who understands cactus culture so thoroughly.

FLOWERING CHRISTMAS CACTUS

This question in the August JOURNAL is perhaps the one most frequently met with and is not easily answered unless one knows where the plants are being grown. We find here in California that unless some slight check is given to vigorous growing specimens late in summer, flowering is forgotten in lush growth. About October we try to withold water to a limited extent to check growth and induce the formation of flower buds.

Another cause of failure may be where the plants flowered profusely the year previous and had not recovered sufficiently for the effort in time, in fact remain somewhat shrunken until late the following summer. The flowering of all plants may be regarded as their effort toward reproduction of the species, a weak specimen is prone to this, and a vigorous one often tries to do more than the stored up energy within the plant can sustain in midwinter when the growth is at a minimum of recuperative power. Grafting seems not to make any difference though Schlumbergera seems to recuperate quicker than *Zygocactus*.

The question of the best stock to graft on is a good subject for discussion, it must be one that is stout enough to support the head when large, yet not too clumsy in appearance, and must be compatible.

E. O. ORPET, Santa Barbara, Calif.

An answer to the inquiry of Mr. J. D. Carey Dennis on page 46 of the September issue of the JOURNAL may be of interest to other readers, as this question is frequently asked.

To separate seed from Epiphyllum fruits or any other juicy cactus fruit: peel the fruit and place it on a fairly coarse-mesh cloth, bringing the edges together to form a bag. Crush and work the fruit thoroughly under running water or in repeated changes of water. The mucilaginous substance, sugar and part of the pulp will pass through the cloth. Wring out, stretch the cloth out flat and spread the mass of seeds and pulp thinly over it to dry. Or transfer to paper and spread thinly on that. After drying, the seeds will brush off quite clean, the pulp adhering to the cloth or paper.

R. W. POINDEXTER, Long Beach, Calif.

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